

Atari®

AdSpeedST

Advanced 68000
Accelerator for Atari ST
Computers

ICD

Owners Manual

For further information or technical support contact ICD, Inc. at 815-968-2228 or via modem at 815-968-2229 (BBS); 76004,1600 (CompuServe); or ICDINC (GENie and Delphi).

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Introduction

AdSpeed ST is a 68000 accelerator for all Atari ST computers. It runs at 16 megahertz (MHz), twice as fast as the 8 MHz a standard ST uses. It won't double the speed of everything your computer does, for reasons described below, but it will produce a noticeable improvement in performance for almost all of your programs.

AdSpeed ST^E is a special version for Atari ST^E computers. With the exception of the installation procedures, any reference to AdSpeed ST also applies to AdSpeed ST^E.

Because of the nature of the ST's operation, some programs will show much more improvement than others.

How It Works

Many of the operations of the ST are limited to 8 MHz due to the computer's design. Simply doubling the clock speed, running the whole computer at 16 MHz, won't work. Access to the system's random access memory (RAM) is regulated by the memory management unit (MMU). The Shifter that produces video images and the Direct Memory Access (DMA) chip that handles floppy and hard disk drives also access the RAM through the MMU. This MMU/RAM/Video/DMA subsystem operates on an 8 MHz bus cycle and cannot be accessed at a higher rate without a complete redesign of the computer.

Even with the 68000 running at 16 MHz, it must emulate an 8 MHz bus cycle when accessing the RAM to remain compatible with the rest of the system. With nothing other than a high speed 68000, little performance increase would be realized.

AdSpeed ST uses a high speed static RAM cache and cache tags to gain its speed increases. When an address is needed by the CPU, first the cache tags are checked to see if that information is already in the cache. If it is not, then the data is read from the computer's RAM into the CPU and the cache. No speed increase is realized.

If the information is already in the cache, then the CPU can use it without having to access the computer's RAM. This allows a full 16 MHz bus cycle. Information is kept in the cache until the space is needed for newer information or a DMA operation occurs.

This RAM cache is most effective with loops in programs, since the whole loop can be stored. Programs using many such loops can run almost twice as fast as usual.

AdSpeed ST^E also has sockets for a Floating Point Unit (FPU) chip and oscillator. When used with a 68000, a 68881 or 68882 FPU does not operate as a coprocessor: it is accessed as a memory-mapped peripheral device. The 68000 lacks the math coprocessor interface of the 68020 and 68030. AdSpeed ST^E maps the FPU at the same address used by Atari's SFP004 unit for full compatibility.

Software *must be written to access the FPU* for it to provide any performance increase. At this time, there is only one commercial program that uses an FPU, and it will only work properly with the 68881, not the 68882. Programs not written to use an FPU will not benefit in any way.

AdSpeed ST Configuration

AdSpeed ST has two jumpers that configure aspects of its operation. These are the pairs of posts **A & B** and **C & D** at the end of the board. To change the settings of these jumpers, move the supplied jumper plug so that it covers both posts or just one post.

A & B determine the starting speed. If they are not connected, AdSpeed ST will begin in 16 MHz high speed mode. This is the way AdSpeed ST is set when shipped. If **A & B** are connected, AdSpeed ST will begin in true 8 MHz mode.

A & B should be connected if you wish the computer to boot in 100% compatible 8 MHz mode. This is useful for copy protected games that don't work properly when accelerated. This does *not* permanently disable AdSpeed ST. You may switch it back to high speed mode through software.

You may optionally install a switch to the **A & B** jumper to control speed switching. This is described later in the **Optional Speed Switch** section.

On AdSpeed ST^E, jumper **A & B** is the one closest to the oscillator socket.

The other jumper, **C & D**, is not used.

520ST, 1040ST, and Mega Installation

Installation of AdSpeed ST is not complicated, but it does require removing the 68000 from the computer. This 64 pin chip is soldered to your

computer's motherboard in ST computers. (ST^E computers have a socketed PLCC 68000.) If you have little or no soldering experience, we highly recommend that you have a knowledgeable technician perform the installation. Your local dealer should be able to handle it. ICD will do the installation for \$40 plus shipping and handling.

Mega Owners: Some Mega computers have a small daughterboard on top of the CPU. This is to correct timing problems with the Blitter. You may remove and discard this board. Circuitry that performs the same function is included in AdSpeed ST. You will need to solder a small jumper wire to your computer to repair a trace cut as part of the installation of this small board. This jumper wire is described later.

Removing the 68000

Removing the 68000 CPU chip from your computer should be done with extreme care. This is definitely not a good candidate for a first-time soldering effort.

Danger! Removing the 68000 from your computer improperly could cause serious and irreversible damage. If you have *any* doubts or misgivings, do not do this yourself. Have your local dealer or ICD perform the installation. ICD charges \$40 plus shipping and handling for installation. Be sure to call first. If your computer has been damaged due to attempted installation, additional charges will be added for repairs. Since damage from improper installation can be severe, ICD may not be able to repair it. The entire risk of installation is yours.

The best way to remove the 68000 is to clip the chip from the board. This will destroy the 68000, but you will not need it again. Using a pair of side cutters or a similar tool, cut the legs from the top near the chip.

Heat each leg from the top of the board with a low wattage soldering iron until the leg is loose and pull it from the board with a pair of needle-nosed pliers. Be careful not to keep the heat applied too long, since this could cause traces or pads to lift from the circuit board.

When all the legs are removed, clear away any remaining solder from the bottom of the board with a solder removal tool.

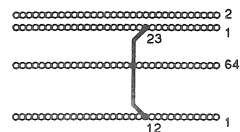


Figure 1
Mega ST Jumper

After the 68000 has been removed, solder the supplied 64 pin socket in its place. Make sure that the notch on the socket points in the same direction that the notch on the 68000 chip did.

Note: If you removed a Mega CPU daughterboard as described above, you will now need to solder a small (30 gauge is fine) jumper wire on the bottom of your computer's motherboard between pin 12 of the new CPU socket and pin 23 of the Mega expansion connector (figure 1). This is the easiest way to repair a trace that was cut when the daughterboard was installed.

Installing AdSpeed ST

Just plug AdSpeed ST into the newly installed socket. Make sure that the notch on the new 68000 points in the same direction the old one did. That's it.

AdSpeed ST^E Installation

The Atari ST^E computer is the most complicated to open. For this reason general instructions for opening this computer are included. There are too many version of the Atari ST series to include opening instructions for all of them, but parts of these instructions are applicable to all of them.

Make sure the power cable is unplugged from the back of the computer. You will be handling the power supply, so it is critical that there be no power connected.

Remove all of the screws from the bottom of the computer. You should find seven short screws and three long ones. Turn the computer right side up, with the keyboard facing you, and remove the top cover. The floppy diskette drive will no longer be secured, so be careful.

Note the orientation of the power and ribbon cables for the floppy diskette drive. Disconnect these and place the diskette drive aside.

Across the front of the computer are two screws at the edge of the shielding and three a little further back on tabs. Remove these three on tabs. They are slightly longer than the rest of the screws securing the shielding and should be kept separate.

Remove the remaining 16(!) screws holding the top shield in place.

Straighten the seven metal tabs through slots holding the top shield in place.

Remove the perforated upper shield in the back left. This covers the power supply.

Remove the two screws holding down the front of the power supply.

Lift the entire motherboard/shielding assembly from the computer, pulling forward to free the connectors from the rear of the case.

Remove the six hex nut bolts from beside the connectors on the rear of this assembly.

Remove the three screws and star washers holding the thin rear shielding onto the main assembly.

Carefully pry the thin shielding away from the audio and RF video RCA jacks and set it aside.

Remove the screw connecting the power supply to the upper shield.

Note the orientation of the point where the power supply cable connects to the motherboard. Disconnect and set aside the power supply.

Remove and set aside the upper shield.

The CPU chip in 1040/2080/4160 ST^E computers is square and in a socket. "68000" will be written somewhere on the chip. Remove the metal clip from the socket.

It is best to remove the chip from its socket using a PLCC chip extraction tool. It is possible to remove it without the proper tool, but you run the risk of damaging the socket.

Remove the paper from the adhesive backing of the supplied black rubber foot. Stick it on the computer's motherboard just in front of and touching pin 48 (front right) of the 48 pin chip just behind the CPU socket.

When facing the computer from the front, the white writing on AdSpeed ST^E should appear right side up. Align the plug on the bottom of the board with the computer's CPU socket and carefully push it into place. This connector is designed to insert one way. One of the corners is cut off, and one of the corners of the socket is filled in. The plug should fit in the socket tightly, but you should not need to force it.

Reassemble the computer in the opposite order it was disassembled. If you end up with extra parts, try again.

FPU Installation

Either a 68881 or 68882 FPU will work in an ST^E, but *current software only supports the 68881*. You may use any speed chip.

Make sure you insert the FPU properly. Pin one is clearly marked on the circuit board.

Insert a standard four pin crystal oscillator into the four holes just in front of the FPU socket. Make sure the dot on the oscillator and the dot on the circuit board are lined up. Carefully solder the oscillator's four leads. The speed of the oscillator should not exceed the rated maximum operating speed of the FPU chip. It can be less.

Our tests have shown that using a 68881 at 16 MHz shows a great improvement over running one at 8 MHz, but increasing the speed further provides limited increase in performance. With a program that supports the FPU, you will see a 1000% to 2000% improvement in performance. With programs that do not support the FPU directly, you will see no improvement.

Optional Speed Switch

You may, if you wish, install a hardware switch to AdSpeed ST A & B jumper. This switch will perform two different but related functions.

The first function of the switch is to determine the starting speed. If the switch is open, AdSpeed ST will boot in 16 MHz mode. If it is closed, AdSpeed ST will boot in 8 MHz mode. You may change from the default speed with either the switch's second function or the software.

The second function of the switch is to change speed while the computer is running. If the switch is opened, the speed will change (if necessary) to 16 MHz. If the switch is closed, then the speed will change (if necessary) to 8 MHz.

Note that the position of the switch does not necessarily reflect the operating speed of AdSpeed ST, since the speed may be changed through software. For example, if the switch is in the 16 MHz position and you use 8MHZ.PRG to change the speed, you will have to move the switch to the 8 MHz position and back to the 16 MHz position to change the speed to 16 MHz.

To install this option, locate a suitable single pole single throw switch and mount it somewhere on the case. Connect the switch to the A & B post pair with 30 gauge wire using solder or a wire wrap tool. You can label the positions to help remember which is which if you wish.

The Software

The included diskette contains several programs and desk accessories to enhance the operation and use of AdSpeed ST.

This software may be updated or completely changed in the future, so be sure to check the READ.ME file on the diskette for additional information.

8MHZ.PRG and 16MHZ.PRG

As you might imagine, these programs will change the operating speed of AdSpeed ST to either 16 MHz (16MHZ.PRG) or 8 MHz (8MHZ.PRG). They may be run from the desktop by double-clicking or placed in your AUTO folder to automatically execute when the computer boots. This way you can set up specific boot disks for applications that automatically set the proper speed.

ADSPEED.PRG

This program provides a corner indicator, a hot key, and automatic switching for specified applications.

The corner indicator is an icon containing either an "8" or a "16" to show current operating speed. The indicator may be turned on and off with the hot key, ADSPEED.ACC, ADSPEED.CPX, SHOW.PRG, or HIDE.PRG as described later.

When running benchmark programs such as Quick Index, the indicator (and any other programs or accessories running interrupt code) will slightly lower measured performance. For best results when running benchmark programs, turn off the indicator and remove any desk accessories and AUTO folder programs that use interrupts. The indicator can also interfere with paint programs.

The hot key allows you to change the operating speed between 8 MHz and 16 MHz and turn the indicator on and off with key combinations. The default hot key is the asterisk key (*) on the numerical keypad. This may be changed with the ADSPEED.CFG file as described later.

To change the operating speed of AdSpeed ST, hold down the control, left shift, and alternate keys and press the hot key. To turn the corner indicator on or off, hold down the control and left shift keys and press the hot key.

The hot key is not operational when **ADSPEED.ACC** or **ADSPEED.CPX** are open.

To install **ADSPEED.PRg**, create an **AUTO** folder on your boot disk (A if you are booting from floppy diskette, usually C if you are booting from a hard drive) if it does not already exist. Then copy **ADSPEED.PRg** into this **AUTO** folder. The next time you boot your computer, **ADSPEED.PRg** will be installed.

Alternatively, you may run **ADSPEED.PRg** from the desktop by double-clicking on it.

ADSPEED.CFG

A few programs don't work at 16 MHz. The corner indicator interferes with some paint programs. And the hot key can conflict with some other programs. **ADSPEED.PRg** provides a way to build a list of the programs so that the speed will automatically change, the indicator will automatically turn off, or the hot key will automatically be disabled whenever the program is run. This is done through the **ADSPEED.CFG** text file.

ADSPEED.PRg looks for a file called **ADSPEED.CFG** in the root directory of your boot drive. If it is not present, then the hot key defaults to "*" on the numerical keypad, the indicator turns on, and the operating speed follows the setting of the jumper on the AdSpeed ST board.

ADSPEED.CFG is a standard text file created and edited with any normal ASCII editor. An example is provided on the disk. The lines of text in **ADSPEED.CFG** allow you to specify the hot key, operating modes for individual or groups of programs, and default operating modes.

If you have programs that will not operate properly at 16 MHz (games, 512 color paint and display programs, etc.) or programs with which the indicator or hot key will interfere (paint programs, etc.) you can include a line in **ADSPEED.CFG** with the following format:

```
filename, speed, indicator, hotkey
```

The filename can be any valid program name (up to eight characters with up to three characters for an extension). Wild cards are allowed. The speed argument should be "0" for no change (stay at the current operating speed),

"8" for 8 MHz, or "16" for 16 MHz. The indicator argument should be "0" for no change, "S" for show, or "H" for hide. The hotkey argument should be "0" for no change, "Y" for enabled, or "N" for disabled. Do not include the quotation marks.

For example, the line

```
spx.pr g, 8, h, n
```

will switch to 8 MHz, hide the indicator, and turn off the hot key whenever the program "spx.pr g" is run, while

```
qindex*.pr g, 0, h, 0
```

will leave the speed as it was set, turn off the indicator, and leave the hot key as set when any program matching "qindex*.pr g" (such as **QINDEX15.PRg** or **QINDEX21.PRg**) is run.

You may also specify the startup setting of these features by including the line

```
speed, indicator, hotkey
```

in the **ADSPEED.CFG** file. These settings will take effect as soon as **ADSPEED.PRg** is executed.

Finally, you may change the hot key in the **ADSPEED.CFG** file. The line

```
hot=key
```

will specify which key is used. "key" must be one of the keys on the numerical keypad (0 1 2 3 4 5 6 7 8 9 () / * + . or E for the ENTER key). If no "hot=" line is included, the asterisk key (*) is used. For example,

```
hot=0
```

makes the 0 key on the numerical keypad the hot key.

ADSPEED.ACC

This desk accessory allows you to switch between high speed operation and true 8 MHz mode, even while running another program (if that program allows access to desk accessories). If you have installed **ADSPEED.PRg**, it also allows you to change the indicator and hot key status.

To install the accessory, just place the file **ADSPEED.ACC** in the main directory of your boot disk. This will be A if you are booting from floppy

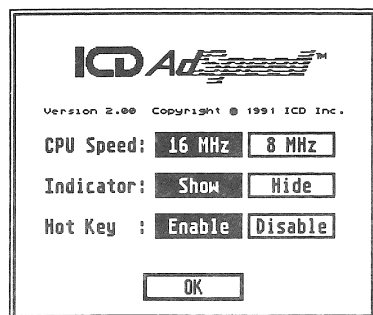


Figure 2
The AdSpeed Accessory

Desk or Atari "Fuji" symbol in the upper left corner of the screen. A menu containing your installed desk accessories will drop down. Move the mouse pointer to the entry named ICD AdSpeed and click the left button.

If ICD AdSpeed does not appear in the desk menu, make sure the file ADSPEED.ACC is in the main directory of your boot disk.

A dialog box will open in the middle of the screen, containing copyright information and seven buttons arranged in four rows (figure 2).

The first row is labeled **CPU Speed:**, and the buttons are **16 MHz** and **8 MHz**. The highlighted button will show the current operating mode of AdSpeed ST. To change the mode, just click on the other button.

The second row is labeled **Indicator:**. The two buttons are labeled **SHOW** and **HIDE**. The highlighted button will show the current status of the corner speed indicator (though you should be able to see this for yourself). To change the status, just click on the other button. This selection is only enabled if ADSPEED.PRГ has been run.

The third row is labeled **Hot Key:**. The two buttons are labeled **ENABLE** and **DISABLE**. These enable or disable the hot key feature. This selection will only be available if ADSPEED.PRГ has been run. It will not be available if you are running a program for which the hot key feature has been disabled in ADSPEED.CFG.

The last button is **OK**. Clicking on this button or pressing the **Return** key will exit the desk accessory.

diskette. If you are booting from a hard drive, it will usually be C. The AdSpeed accessory will automatically be installed when your computer boots.

ADSPEED.ACC may also be used in conjunction with MultiDesk from Codehead Software, whether MultiDesk is used as an accessory or a program. Consult the MultiDesk manual for details.

After installing the AdSpeed accessory, you may use it any time the menu bar is active. move the mouse pointer up to the

ADSPEED.CPX

This is a version of the AdSpeed ST accessory written to be an extension for Atari's new extensible control panel XCONTROL. You must have Atari's XCONTROL control panel to use ADSPEED.CPX.

Install it as you would any other CPX module. Check Atari's documentation for details.

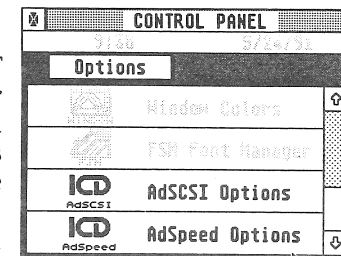


Figure 3
XControl selection list

To access ADSPEED.CPX, run your control panel as usual and scroll if necessary until the ICD AdSpeed Options entry (with the ICD logo) is showing (figure 3). Double-click on this entry to activate ADSPEED.CPX.

The functions ADSPEED.CPX performs are the same as ADSPEED.ACC. It has five buttons (figure 4): one each for speed, indicator, and hot key, an OK button, and a CANCEL button.

Next to **CPU Speed:** is a button that will report the current operating speed (16 MHz or 8 MHz). To change this value, click on the button, then click on the speed you wish to use.

Next to **Speed Indicator:** is a button that will say ON or OFF, depending on the current state of the indicator. Click on this button, then your selection, to change it. This button will be disabled if you have not run ADSPEED.PRГ.

Next to **Hot Key:** is a button that shows the status of the hot key function. Click on the button, then your choice, to change it. As with the speed indicator, this option will be disabled if you have not run ADSPEED.PRГ or if you are running a program for which the hot key has been disabled in ADSPEED.CFG.

Unlike changes made in ADSPEED.ACC, any changes made in ADSPEED.CPX will not take effect until you either click on the close button (upper left hand corner), click on OK, or press the RETURN key. Clicking on CANCEL will cancel any changes you have made and exit ADSPEED.CPX.

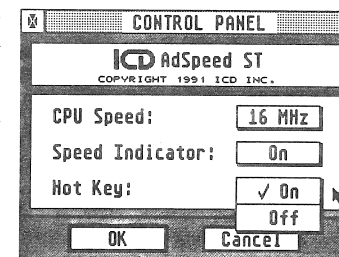


Figure 4
ADSPEED.CPX

SHOW.PRG and HIDE.PRG

These programs will either enable or disable the speed indicator when run. They require that ADSPEED.PRG be installed first.

Quick ST II

Branch Always Software has created a special version of Quick ST II specifically for use with AdSpeed ST.

Quick ST increases the speed at which the Atari ST operating system can perform screen operations, such as displaying text, drawing windows and dialog boxes, redrawing the desktop, and others.

This special version of Quick ST will run on any Atari ST computer in which an AdSpeed ST is installed. The SC1224 color monitor, SM124 and 125 monochrome monitors, SM194 or Moniterm Viking 19 inch monitors, and ISAC graphics card are all supported. Quick ST is compatible with all versions of TOS from 1.0 to 1.6.

The QUICKST folder on the supplied diskette contains the following files:

READ.ME

Read this file by double-clicking on it and selecting SHOW. It contains the most recent information about the Quick ST files.

QUICKSTC.PRG

This is the color version of Quick ST. To install, copy it into the AUTO folder of your boot drive.

QUICKSTM.PRG

This is the monochrome version of Quick ST. To install, copy it into the AUTO folder of your boot drive.

Neither the monochrome version nor the color version will install if the proper monitor is not connected, so it is safe to copy both files into your AUTO folder. This is handy if you often switch between monitors.

QST2CUST.ACC

The Desktop Customizer allows you to have a custom desktop background and switch Quick ST on and off. QST2CUST.ACC will not run in low resolution.

To install QST2CUST.ACC, copy it to the root directory of your boot drive and reboot the computer. To access it, move your mouse pointer to DESK or Atari "Fuji" in the menu bar to drop the desk accessory menu. Move the mouse pointer to Quick ST II and click the left mouse button.

You may also run the customizer as a program. Make a copy of QST2CUST.ACC and rename it QST2CUST.PRG. Run this program by double-clicking on it.

The Desktop Customizer has two groups of menu selections on the left. The first set contains four selections:

Save Custom Fill — this will save the current custom fill pattern to a file selected by the user. Fill pattern files should have a .QFL extension.

Load Custom Fill — this will load a saved fill pattern. If the new pattern contains different colors than the current display, you will be prompted to choose between the current colors and the new ones.

Load Desktop Picture — this will load a full-screen picture and install it as the desktop background. If the picture uses different colors than the current display, you will be prompted to choose between the current colors and the new ones. Any standard .PI2 (color) or .PI3 (monochrome) will work.

Save Defaults — this saves the current customizer options to disk. Options include the selected picture, the fill pattern, background mode (described next), and screen colors.

To allow selecting the Picture Background option (described later), you must save defaults and click on Yes when asked to enable picture loading. To disallow this option and reduce memory requirements by 32K, click on No.

The default settings are saved directly to the Quick ST program file, so make sure you are using a backup.

The second set contains background mode options:

Normal Background — this option turns off the custom desktop background. In other words, it returns the desktop to its usual green or grey.

Fill Background — this sets the desktop background to the current fill pattern. Fill patterns are 16 pixels square, so they use very little memory. The performance and memory requirements of Quick ST are not affected by this.

Picture Background — this replaces the desktop background with a picture. The performance of **Quick ST** drops by less than 1% when this option is active. Memory requirement is increased by 32K. For this option to be available, you must have enabled loading of a desktop picture with the **Save Defaults** option as described earlier.

The large box in the middle of the Desktop Customizer screen is the fill pattern editor. The fill pattern is enlarged for easier editing. To box to the right shows the fill pattern actual size for reference.

To edit a fill pattern, select a pen color from the small boxes above the edit box. Move the mouse pointer to the part of the fill in the edit window you wish to change and click with the left mouse button. To change the entire fill pattern to the selected color, click with the right mouse button.

To immediately view the new fill pattern in effect, make sure that the **Fill Background** option is selected and click on the small reference fill display to the right.

To switch **Quick ST** on or off, click on the **On** or **Off** beside **Quick ST**: on the right side. This will not free the memory used by **Quick ST**.

QINDEXI.PRG

Quick Index has become the standard performance benchmark program for the Atari ST. It performs eleven tests in three major areas: CPU performance, disk drive performance, and screen output performance. Using **Quick Index**, you can see how much **AdSpeed ST** and **Quick ST** increase your system's performance.

You may run the program by double-clicking on it, or by renaming it **QINDEXI.ACC** and installing it as a desk accessory.

The eleven tests are conducted one at a time. For each test, a percentage number is displayed comparing your computer's performance to a reference. 100% means that the value is the same as the reference value. 50% means that your computer is performing half as well as the reference. 200% means that it is performing twice as well.

You may run each test individually by clicking on the name of the test, or run all of them by clicking on **Do All Tests**. To quit the program, click on **Exit**.

You may choose any one of nine reference systems for comparison: TOS 1.0, TOS 1.2/1.4, and TOS 1.6 in each of three screen resolutions. The

default reference system will be your actual configuration. You may change this by clicking on any of the buttons in the lower right corner.

The first four categories are related to CPU speed. These will show the effect of **AdSpeed ST**.

The next three categories are related to disk drive access. The reference is a floppy diskette. To select which drive to test, click on the drive letter to the right. Make sure the disk is not write protected prior to running the test. The **Disk (RPM)** category should show 300 for floppy diskettes, 3600 (usually) for hard drives. If you are using a cache on your drive (such as that provided by ICD's Hard Disk Driver), these numbers will be much higher.

The TOS and GEM categories are related to screen text and graphics speed. Both **AdSpeed ST** and **Quick ST** will affect these numbers. Try running these tests with and without **Quick ST** and **AdSpeed ST** to see the drastic differences.

Note: Many AUTO folder programs and desk accessories will lower test results. Be sure to turn off your speed indicator, on-screen clocks, etc., and cut out as many programs and accessories as possible to get the most accurate results.

Moniterm Viking Large Screen Monitor Compatibility

A small modification must be made to the Mega large screen monitor interface card for compatibility with **AdSpeed ST**. You will need a 68 picofarad capacitor, a low wattage soldering iron, and some solder.

Locate integrated circuit U32 on the interface card. It is a socketed PAL chip directly in front of the square 68881 FPU socket looking at the board from the front of the computer. Clip the leads of the capacitor to about 1/4". Solder the leads of the capacitor to pins 18 and 20 of the chip. These are on the upper right of the chip, toward the FPU socket.

If you have any reservations about performing this modification yourself, contact your local dealer or ICD.

Compatibility

There are very few programs with which AdSpeed ST will not be compatible in high speed mode. Programs that depend heavily on the time it will take to execute instructions will not work as designed. Some programs, especially games, may run too fast. Others, such as 512 color paint and viewing programs, may produce a garbled display. In general, any program that assumes that instruction execution will take a specific amount of time will not work as expected.

Switching AdSpeed ST to normal 8 MHz mode, either with software or the hardware switch as described earlier, should solve *all* compatibility problems. Your computer will perform exactly as if AdSpeed ST was not installed. Fortunately, very few programs have problems running at high speed.

Programming Information

The first following section shows how to detect the presence of an AdSpeed ST accelerator and how to change its speed. This is provided for programmers who wish to include these features in their programs.

The second describes briefly how to access the FPU in AdSpeed ST[®].

AdSpeed ST Detection and Switching

The first listing, ADSTEST.S, is 68000 assembly language that produces a standard DRI linkable object module when assembled with the MADMAC or AS68 assemblers included with the Atari developer package. It should be easy to modify it to work with other assemblers.

```
* ADSTEST.S: routines to detect the presence of an AdSpeed ST and
* switch its speed.

* count of less than threshold means 8 MHz, greater than or equal
* to threshold means 16 MHz (or higher).
threshold      equ      550

* set AdSpeed ST to 16 MHz
      .globl  SET16
      .even
SET16:
      move    #0,$f00000
      rts

* set AdSpeed ST to 8 MHz
      .globl  SET8
      .even
SET8:
      move    #0,$f10000
      rts

* enter supervisor mode
      .even
super:
      clr.l    -(sp)
      move.w   #$20,-(sp)
      trap     #1
      addq.l   #6,sp
      move.l   d0,savessp      ;save supervisor stack pointer
      rts

* exit supervisor mode
      .even
xsuper:
      move.l   savessp,-(sp)    ;restore supervisor stack pointer
      move.w   #$20,-(20)
      trap     #1
      addq.l   #6,sp
      rts

* test for existence of AdSpeed ST
* out: d0=1 if found, 0 if not found
      .globl  ISADS
      .even
ISADS:
      bsr      super            ;must be in supervisor mode
      bsr      gcount           ;get count of divides in tick of
      cmp.l    #threshold,d0    ;200 Hz counter. Determine present
      blt.s    is8              ;system CPU speed.

      move.w   #1,tspeed

is8:
      move.w   sr,d5            ;save some stuff
```

```

        move.l  a7,a5
        move.l  8,old8
        move.l  #unpatch,8      ;patch address error vector temporarily

isa:
        tst.w   tspeed
        bne.s   t16

        bsr     SET8            ;to see if AdSpeed ST exists, try setting
        bra.s   setex          ;to current CPU speed

t16:
        bsr     SET16

setex:
        move.w  #1,exists      ;if no error, got here and set this flag

unpatch:
        move.l  a5,a7          ;if an address error, flag was not set and
        move.w  d5,sr          ;execution went straight here
        move.l  old8,8
        bsr     xsuper         ;leave supervisor mode
        clr.l   d0
        move.w  exists,d0      ;exit with boolean in d0
        rts

* out: d0 = number of divides in one tick of 200 Hz counter
gcount:
        clr.l   d0             ;d0 is counter
        move.l  $4ba,d2        ;d2 is start tick

tick:
        cmp.l   $4ba,d2        ;wait for start of tick
        beq.s   tick

        move.l  $4ba,d2

loop:
        move.l  junk,d1        ;do divides until next tick
        divu    #2,d1
        addq.l  #1,d0
        move.l  #4ba,d1
        cmp.l   d2,d1
        beq.s   loop

        rts

junk:   dc.l    $80000000
exists: dc.w    0
savessp:dc.l    0
tspeed: dc.w    0
old8:   dc.l    0
        .end

```

The next example is a Personal Pascal program that demonstrates the use of ADSTEST.S.

```

{$s1}

program test;

(*
  Demonstrate how to use the functions in ADSTEST.S:
  1. Assemble ADSTEST with DRI compatible assembler.
  2. Compile this program with Personal Pascal.
  3. Link with ADSTEST.O.
*)

function isads:boolean;external;

procedure set16;external;

procedure set8;external;

var ok:boolean;c:char;

begin
  ok:=isads;
  writeln;
  writeln('AdSpeed ST found? ',ok);

  if ok then begin
    write('Press any key to set AdSpeed ST to 8 MHz ');
    read(c);
    set8;
    writeln;

    write('Press any key to set AdSpeed ST to 16 MHz ');
    read(c);
    set16;
    writeln;

  end;
end.

```

AdSpeed ST[®] FPU Access

When the optional FPU chip and oscillator are installed, AdSpeed ST[®] provides an FPU interface compatible with Atari's SFP004 Floating Point Coprocessor board.

It is possible that your compiler or assembler already supports accessing the FPU. If not, you may be able to write your own code for FPU access.

The FPU is mapped into memory as a peripheral device starting at address \$FFFFFFA40. Consult the Motorola MC68881/MC68882 *User's Manual* for details on registers and FPU use. This manual is available in the US for \$8.20 + \$2 S&H from Motorola Literature Distribution, P. O. Box 20912, Phoenix, Arizona 85036. You may call them toll-free at (800) 521-6274 for orders. They may also still have available application note AN947/D, *MC68881 Floating-Point Coprocessor as a Peripheral in an M68000 System*. Write them for availability and pricing.

Other ICD Products

ICD has been producing products for Atari computers since 1984 and is widely acknowledged as the leader in third party hard drive systems. Below are some of the reasons.

AdSCSI ST Host Adapters

A *host adapter* is an interface board that allows you to connect standard SCSI devices, such as hard drives and hard drive controllers, to your Atari ST computer.

All ICD host adapters are of the highest quality; they are designed, laid out, assembled, and tested in our own facility.

The continuously evolving driver software provides speed and flexibility available nowhere else. Configurable read/write caching gives you unmatched hard drive access speed. Full removable media support allows you to switch cartridges at will. Partition sizes up to a half gigabyte (512 megabytes) are supported. You can turn partitions on and off and even swap them around.

Our formatting software is both flexible and easy to use. When possible, it automatically identifies the drive and supplies all needed data. You can set up as many as 64 partitions on a single drive, in sizes from 1 megabyte to 512 megabytes.

A wide variety of other utility programs and accessories are included with each ICD AdSCSI host adapter to make it as easy, efficient, and powerful to use as possible.

AdSCSI Plus ST

Our top-of-the-line host adapter, AdSCSI Plus ST comes with all the software listed above. It provides full drive on the SCSI bus and supports the full SCSI command set. It has both an IN port for connection to the computer and an OUT port for connection to other devices. AdSCSI Plus ST has a built-in real time clock/calendar so your computer will always know the time and date. A cable for connecting to your computer and an extensive, complete manual are included.

AdSCSI ST

AdSCSI ST provides everything AdSCSI Plus ST does except the clock, and it is about 1/3 the size. If you have a Mega ST or already have a clock for your computer, then AdSCSI ST is for you.

AdSCSI Micro ST

With a standard 3½" SCSI hard drive and AdSCSI Micro ST, you can easily install a hard drive *inside* your Mega computer! All you need is a screwdriver for installation. AdSCSI Micro ST comes with a hard drive mounting bracket, all needed cables, ICD's AdSCSI software, and a detailed, comprehensive, and *useful* manual (written by, yes, the same person writing these words).

FA•ST Hard Drive Kits

To make assembling your hard drive system even easier, ICD offers complete kits containing everything that you need to connect a standard hard drive mechanism to your computer.

All FA•ST hard drive kits include ICD's adjustable under-monitor case, AdSCSI Plus ST host adapter, power supply, quiet fan, AdSCSI software, complete manual, all needed hardware, and all cables. You just supply the drive mechanism. These kits will hold one 5¼" half-height hard drive mechanism or two 3½" mechanisms.

The FNST kit is for embedded SCSI drives. FMST and FRST also include the needed controller for MFM and RLL ST506/412 drives.

FA•ST Hard Drive Systems

ICD also offers complete hard drive systems, ready to connect to your computer and use immediately. These systems use high quality, high speed Quantum drive mechanisms for years of reliable use. The sleek cases fit comfortably under your monitor. They include a cable for connection to your computer, an OUT port for connection of other devices, a comprehensive manual, and AdSCSI software. The drives are completely formatted and ready to use. Call for available sizes and prices.

FA•ST Tape Backup

Everyone who has a hard drive knows that they should back it up regularly. Unfortunately, backing up to floppy diskettes is so time consuming, few of us do it often enough. Then some buggy program or power outage scrambles your data beyond repair, and you find that your most recent backup is two months old. Two months of work are gone.

ICD's FA•ST Tape Backup addresses the problem of tedious backups by storing up to 155 megabytes on each tape at the amazing rate of 6.5 megabytes per minute. The software allows you to back up some or all of your partitions automatically or manually, recover entire partitions or

individual files, and even back up partitions used for alternate operating systems.

The FA•ST Tape Backup unit has room for a hard drive in the same case, so you can add your own or order the unit from ICD with any of our drives installed.

Cleanup ST

No matter how careful you are, the chance that a power glitch or an errant program will corrupt the information on your hard drive is very real. Cleanup ST does the most complete job of analyzing, identifying, and recovering from (if possible) this type of damage. If you own a hard drive, you need to have Cleanup ST, just in case.

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AdSpeedST



**Advanced 68000
Accelerator for Atari ST
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Owners Manual